WHAT IS CLAIMED IS:

1. An optical apparatus having a vertical light receiving element comprising:

a vertical photo detector having a photo-absorption layer; and

an optical bench having a first surface and a second surface for mounting the photo detector thereon and a first groove and a second groove formed adjacent to each other; the first groove having a predetermined inclination and being opposite to the second surface of the optical bench onto which the photo detector is disposed,

wherein a light signal incident to the first groove is refracted at a predetermined angle by the first groove; and the refracted light by the first groove is reflected by the second groove, so that the light signal reflected by the second groove is substantially and vertically incident into the photo-absorption layer.

2. The optical apparatus as claimed in claim 1, wherein the optical bench is made from a semiconductor material and has an inclined profile through a wet-etching process.

3. The optical apparatus as claimed in claim 1, wherein the optical bench is made from one of a group VI, a group II-VI and a group III-V semiconductor substrate.

4. The optical apparatus as claimed in claim 1, wherein the optical bench is a silicon optical bench.

5. The optical apparatus as claimed in claim 1, wherein the vertical photo detector is a top surface illumination-type photo detector.

6. The optical apparatus as claimed in claim 1, wherein the vertical photo detector is a back illumination-type photodiode photo detector.

7. The optical apparatus as claimed in claim 1, wherein the first groove and the second groove are formed so as to have a slant angle of 50° to 60° .

8. The optical apparatus as claimed in claim 1, wherein the first groove or the second groove is formed so as to have a 'U' shape or a 'V' shape.

9. The optical apparatus as claimed in claim 1, wherein the first groove further comprises an anti-reflective coating layer so that the light signal is refracted without a reflection when the light signal is incident into the optical bench.

10. The optical apparatus as claimed in claim 10, wherein the anti-reflective coating layer is a deposited film, which is formed by a chemical vapor deposition process or a physical vapor deposition process.

11. The optical apparatus as claimed in claim 1, further comprising a total reflection layer formed on the second groove.

12. The optical apparatus as claimed in claim 12, wherein the total reflection layer is a metal layer having thickness substantially larger than the skin depth of the metal layer.

13. The optical apparatus as claimed in claim 12, further comprising a dielectric film formed between the optical bench and the metal layer.

14. The optical apparatus as claimed in claim 1, wherein the optical bench has a higher energy bandgap than that of the light signal.

15. An optical apparatus having a vertical light receiving element comprising:

a vertical photo detector having a photo-absorption layer;

an optical bench on which the photo detector is mounted having a first groove and a second groove formed adjacent to each other, the first groove having a predetermined inclination;

a light source;

a substrate for mounting the light source and the optical bench on which the photo detector is mounted,

wherein a light signal generated from the light source is refracted by the first groove and then is incident to the inside the optical bench, and

the refracted light signal by the first groove, is reflected by the second groove, so that the final reflected light signal is substantially and vertically incident into the photo-absorption layer.

16. The optical apparatus as claimed in claim 15, wherein the light receiving element further comprises an anti-reflective coating layer formed on the first groove so as to minimize loss of the light signal.

17. The optical apparatus as claimed in claim 15, wherein the light receiving element further comprises a total reflection layer formed on the second groove.

18. The optical apparatus as claimed in claim 15, wherein the optical bench is a silicon optical bench.

19. The optical apparatus as claimed in claim 15, wherein the light source is made from a Planar Lightwave Circuit (PLC).

20. The optical apparatus as claimed in claim 15, wherein the substrate is a silicon substrate.